TWGSS/PGS: Pushing the System

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Brigadier General Bolte's article in the November-December 1996 issue of *ARMOR* provided excellent insight into the new Tank Weapon Gunnery Simulation System/Precision Gunnery System (TWGSS/PGS) system which units are currently fielding. Although his article primarily focuses on the technical aspects of the system and its use in gunnery training, he does begin to explore maneuver issues at the end of his article. At Fort Lewis, 1-33 AR, 3/2ID recently completed a TWGSS/PGS maneuver and gunnery rotation in lieu of crossing the mountains and conducting similar training at Yakima Training Center. The exercise goal was to sustain platoon and individual gunnery skills, improve platoon maneuver tasks and battle drills, explore the new simulation system's limitations, and reduce unit OPTEMPO. This exercise was the product of a brainstorm of our Brigade Commander, COL Peter W. Chiarelli, who had previously served as the G3 for First Cavalry Division at Fort Hood and was extremely impressed with the system. It was this relationship that enabled us to borrow a company TWGSS and PGS set from Fort Hood; otherwise the exercise would have been limited in scope to gunnery only.

Exercise Concept

The exercise had three phases. Although it is the reverse of conventional platoon and gunnery training, we initiated training at the platoon level by conducting a Janus exercise which allowed platoon leaders to practice many of the tasks which they would have to complete in the Situational Training Exercise (STX) lanes, on the same terrain which they would actually conduct the tasks. This consisted of one day for system familiarization, one day for an attack lane, and one day for a lane training defense of a battle position. The objective was to train troop-leading procedures, battle drills, fire distribution and control, engagement area development, and validate platoon standard operating procedures. This training paid large dividends in the platoon STX lanes as all platoon leaders had established a solid foundation in these tasks to build on during the STX lanes.

STX Lanes

The second phase was platoon STX lanes. Although the terrain on Fort Lewis is heavily wooded, we were able to take advantage of the drop zones and some open areas to conduct the STX lanes. The first two days in the lanes were independent training days for company commanders to train platoons on skills and tasks, such as TWGSS/PGS gunnery, actions on contact, battle drills, and developing an engagement area. On the afternoon of the second day, the platoon leader received an operations order from the company commander to conduct a hasty attack the next morning. A platoon observer/controller linked up with the platoon at this point and stayed throughout the next three days, concentrating on observing the platoon leaders' preparation for each mission. At 0900 the next morning, after a short road march, the platoon conducted a hasty attack into a small 1.5km x 3km "bowl" surrounded by woods. The OPFOR was an M1A1-equipped with TWGSS, an M113 equipped with MILES, and a dismounted AT team equipped with MILES. This simulated a degraded combat security outpost (CSOP). The Bradley Fighting Vehicle (BFV) platoons' OPFOR consisted of two BFVs which also had a dismounted AT team. After the scenario was completed, the second O/C, who was the permanent lane O/C, downloaded the data from

the OPFOR vehicle's Turret Drive Retrieval System (TDRS) card. In the M1A1 or BFV, the TDRS card fits inside the TWGSS or PGS computer. This card is a computer PCI card that fits into the side of a laptop computer and utilizes SAAB TWGSS/PGS software to download data retrieved from the TWGSS/PGS computer in the M1A1 or BFV. The O/C or master gunner can also program into the card the number and types of rounds each vehicle will have "on board" for each scenario, as well as ammo dispersion and load time for each round. The information that the O/C downloads shows where the BLUEFOR vehicles hit the OPFOR vehicles and identifies each weapon system and type of ammunition used. The lane O/C subsequently marked and labeled these hits and misses on a data board which we constructed to show the crews where their rounds were impacting and where they were receiving direct fire hits. This board had several M1A1 and M2 side silhouettes and frontal silhouettes; the front was OPFOR vehicles and the back was BLUEFOR vehicles. The computer identifies which vehicle fired each round and presents the azimuth and elevation of the projectile, as well as a silhouette illustrating the point of projectile impact. We duplicated this display with our board to provide this information to the platoon during the after-action review (AAR). While the lane O/C debriefed the OPFOR, the company commander issued a FRAGO to the platoon leader to conduct a tactical road march and prepare for a dusk attack.

In the afternoon, once the platoon was set in the new assembly area, the lane O/C downloaded the platoon's TDRS cards and transferred the information to the data board. At this point, the platoon O/C and the lane O/C presented the platoon with their first formal AAR. The format was essentially the basic AAR format, except that, when we talked about what happened during the engagement, we used the data board to illustrate the results of the battle. This aided the O/C in presenting gunnery results and maneuver mistakes. The feedback provided a limited informal TC/BC Proficiency Couse, which COL Chiarelli felt would be an imbedded byproduct of using the TWGSS/PGS system.

A few hours later, the platoon conducted another hasty attack against a degraded CSOP, this time in open terrain on Rogers DZ, the largest drop zone on Fort Lewis. Once again, the lane O/C downloaded OPFOR information from the vehicle TDRS cards after the attack. In the morning, the O/C downloaded the BLUEFOR information, marked and labeled hits and misses on the data board and both O/Cs guided the platoon through their second AAR. The company commander then provided the platoon with a final FRAGO, which was to defend a battle position in Rogers DZ.

After about 20 hours of structuring the engagement area, which included utilizing ACEs to dig battle positions, the platoon conducted an early morning defense against an MRC or TC. At the end of the defense, the platoon was engaged with artillery which delivered a persistent chemical agent. The platoon moved to an operational decontamination while the lane O/C simultaneously downloaded nine to ten OPFOR cards and transferred pertinent information to the data board. Once the platoon completed operational decontamination, the O/C downloaded the platoon's cards and transferred the information to the data board. The platoon received its final AAR from the O/Cs and then moved back to a company assembly area to prepare for gunnery as the two other platoons in the company subsequently completed the STX lanes. This did not take long, as the schedule was echeloned so that when the first platoon was completing the defense lane, the second platoon was conducting the first attack lane at 0900 the same day. This allowed company commanders to observe and participate in each platoon's STX lane.

Gunnery

The third phase was a full gunnery exercise. Gunnery on Fort Lewis was a little more tricky than maneuver because, although we were able to use drop zones, the largest drop zone was simultaneously occupied by STX lanes as another company was conducting gunnery. Additionally, to run a Tank/Bradley Table (TT/BT) VII-XII on the same drop zone required over forty main gun and troop targets and TT V/BT VI live fire required ten more targets. This may not seem like much on most installations, but since we usually conduct TT/BT VII-XII at Yakima Training Center, the majority of targets and lifters were across the mountains. SFC Barry Putney, our Battalion Master Gunner, and MSG Larry Burch, our Brigade Master Gunner, worked with Range Control and TASC to finally meet all of our target needs. The second challenge was to create a challenging TTV and BTVI on a narrow, confined MK-19 range and create another range on the drop zone which could accommodate TT/BT VII-XII with minimal movement and changeover of targets. SFC Putney, with the help of the company master gunners, designed and built these ranges from the ground up in less than three weeks.

TT V and BT VI were conducted on a range usually utilized for Mark 19 familiarization. Although limited to one lane, we were able to build a solid range for both gunnery tables. TT/BT VII and VIII were conducted on Point Salines Drop zone using TWGSS/PGS. SFC Putney was able to place almost all of the targets at doctrinal ranges +/-100m-200m. Feedback provided to crews through the TWGSS/PGS system was comparable to live fire. The crew could see the splash on the target during engagements. During their AAR debrief, using the laptop computer, they could see exactly where they had hit the target and the azimuth and elevation of the strike. For the A2 tank engagement, we were forced to use a MILES transmitter on the .50 Cal. as there is no TWGSS transmitter for this weapon. Scores were comparable to previous gunneries conducted in Yakima, although to conduct a valid test we would have had to fire both main gun and TWGSS/PGS on the same range during the same weather conditions. TT/BT XII was conducted on the same range as TT/BT VII and VIII. Changeover from one range to the other was minimal due to the range design. There were two drawbacks to conducting TT/BT XII on Fort Lewis. The first was that, due to intervisibility lines and drop zone size, we were limited to 2200 meters as our farthest engagement line. This meant that the range bands for TT/BT XII were closer than desired.

The second drawback was that the TWGSS/PGS system in panel gunnery mode (there are two modes: combat, for force on force and panel gunnery, for gunnery tables) does not provide multiple vehicle target feedback. In combat mode, you can load multiple cards and it will show where a vehicle fires and impacts and where he receives fire. Therefore we were not able to see where vehicles were double-servicing targets and shooting out of their assigned sectors within the platoon. We could count target hits by watching the targets fall and we could find out how many rounds were expended to kill those targets, but we

could not actually distinguish one target hit from another using the computer. This could be corrected with a software upgrade by SAAB, which produces the system.

Maneuver Lessons Learned

TWGSS/PGS was an excellent simulation device for force on force training. Later in the exercise, we scanned maps of the maneuver areas into the laptop computers and were able to take advantage of the full capability of the AAR system. Once OPFOR and BLUEFOR cards are downloaded into the laptop computer, a global positioning system in the TWGSS/PGS system that tracks vehicle movement during the exercise also shows the platoon where the enemy was, where BLUEFOR vehicles were, who shot whom, which weapon system was used, where each vehicle hit and was hit, and how the scheme of maneuver developed. During the exercise, we learned to clear each vehicle's TDRS card just prior to execution of the mission. This meant storing fewer events on each card, lessening the chance of a computer lockup due to data overload. Even if the cards are clear, the system can only reliably hold eight cards downloaded from tanks and about five to six cards downloaded from Bradleys (each time a vehicle fires or is hit is an event. Bradleys have more events because of the 25mm chain gun) before it locks up during AAR playback in AAR map mode. Another lesson that we learned is that, although MILES and TWGSS/PGS are compatible, they do not operate well with each other. You must mount retro reflectors on the MILES vehicles to direct the TWGSS/PGS beam back to the TWGSS/PGS to make the system compatible. An exercise like ours, where we needed the retro reflectors for gunnery, makes this impossible since each company system comes with only a limited number of target retro reflectors. Even if retro reflectors are mounted on the MILES vehicles, the feedback system would be of minimal use as the system shows impact points only on the TWGSS/PGS vehicles. Additionally, MILES impacts on the TWGSS/PGS vehicles are displayed as sectional blocks instead of impact points. MILES also has an advantage over TWGSS/PGS in force on force. Since it is not a precision gunnery instrument like TWGSS/PGS, the MILES vehicle has a larger killing potential. We recommend either using one system or the other. Another lesson that we learned was that PGS TOW is an excellent weapon system. During the defense of a BP STX lane, a BFV platoon completely destroyed a TWGSS-equipped tank company with TOW, a performance that would be rare from a MILES BFV platoon.

Gunnery Lessons Learned

TWGSS/PGS was an excellent tool for TT/BT VII-VIII. The feedback system offered crews information, such as azimuth and elevation of shots, which they could not receive during live fire. The one drawback was that most crews had an inordinate amount of trouble hitting targets with the coaxial machine gun on both tanks and BFVs. This was due to an extraordinary amount of 7.62mm dispersion built into the TWGSS/PGS program and the fact that only every third tracer is presented in the GPS and GPS-E. Although the tracer-to-ball ratio is the same as in live-fire gunnery, the increased dispersion makes machine gun use extremely difficult. The technicians from SAAB who visited our unit during training indicated that the Army had requested the tracer simulation ratio and felt that the problem could be remedied through a software upgrade or changing the tracer-to-ball ratio to 1:0; either way this problem must be corrected to harness the full potential of the system's capabilities. As stated previously, we also had to use MILES for the .50 Cal., making A2 engagements difficult to evaluate since the MILES transmitter on the .50 Cal. is notoriously difficult to zero. If the intent is to use the TWGSS/PGS system for home station gunnery, the Army needs to purchase .50 cal. transmitters from SAAB. We had previously discussed the problems with the AAR feedback system for TT/BT XII. We are currently giving feedback to SAAB on these problems. Once again, a software upgrade should be able to solve the multiple card problem in panel gunnery mode.

Conclusion

TWGSS/PGS is an excellent system which, with some minor improvements, could provide an almost true to life simulation for gunnery and maneuver. Although TWGSS/PGS was originally intended for home station gunnery, the system has also proved to be an excellent maneuver simulation. The feedback system, and the fact that crews must prepare their vehicles for precision gunnery instead of simply aligning a rifle scope to a laser, creates a more realistic environment, and allows for more informative AARs. Although we have not experienced the improvements of MILES 2000, we can evaluate the system against MILES and MILES II. TWGSS/PGS appears to be a better system for home station maneuver and gunnery training. Brigadier General Bolte mentioned GAMER on page 47 in the earlier mentioned article. This system allows O/Cs to receive real-time feedback and save the engagement for feedback during the AAR which is one step above current TWGSS/PGS capabilities. The system also allows TWGSS/PGS to evaluate indirect fire and mine simulation within the scenario. Although relatively expensive (around $500,000), this system would allow for greater home station maneuver training and feedback for AARs. TWGSS/PGS is the future of home station training in the U.S. Army; we should use it as frequently as possible and push the system to its limits. We should also continue to improve the system as more feedback is obtained through frequent use.

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